

Patent claims

1. A method for forming a coating on an inorganic or organic substrate, wherein
 - a) a low-temperature plasma, a corona discharge, high-energy radiation and/or a flame treat-
5 ment is caused to act on the inorganic or organic substrate,
 - b) 1.) at least one activatable initiator or 2.) at least one activatable initiator and at least one ethylenically unsaturated compound is/are applied in the form of a melt, solution, suspension or emulsion to the inorganic or organic substrate, there being incorporated in the activatable initiator and/or the ethylenically unsaturated compound at least one group that interacts with
10 a subsequently applied coating or reacts with groups contained therein, with the effect of promoting adhesion, and
 - c) the coated substrate is heated and/or is irradiated with electromagnetic waves and an adhesion promoter layer is formed,
 - d) the substrate so pretreated is provided with the further coating which contains reactive
15 groups that react with those of the adhesion promoter layer and/or interact with the adhesion promoter layer.
2. A method according to claim 1, wherein the inorganic or organic substrate is in the
20 form of a powder, a fibre, a woven fabric, a felt, a film or a three-dimensional workpiece.
3. A method according to claim 1 or 2, wherein the organic substrate is or comprises a synthetic or natural polymer, a metal oxide, a glass, a semi-conductor, quartz or a metal.
4. A method according to any one of claims 1-3, wherein the organic substrate is or
25 comprises a homopolymer, block polymer, graft polymer and/or copolymer and/or a mixture thereof.
5. A method according to at least one of the preceding claims, wherein the organic
30 substrate is or comprises a polycarbonate, polyester, halogen-containing polymer, polyacrylate, polyolefin, polyamide, polyurethane, polystyrene, polyaramide and/or polyether.
6. A method according to at least one of the preceding claims, wherein the initiator is a compound or combination of compounds from the classes of the peroxides, peroxydicarbonates, persulfates, benzpinacols, dibenzyls, disulfides, azo compounds, redox

systems, benzoin, benzil ketals, acetophenones, hydroxyalkylphenones, aminoalkylphenones, acylphosphine oxides, acylphosphine sulfides, acyloxyiminoketones, peroxy compounds, halogenated acetophenones, phenyl glyoxylates, benzophenones, oximes and oxime esters, thioxanthenes, ferrocenes, titanocenes, sulfonium salts, iodonium salts, diazonium salts, onium salts, borates, triazines, bisimidazoles, polysilanes and dyes, and also corresponding coinitiators and/or sensitisers.

7. A method according to at least one of the preceding claims, wherein the initiator has at least one ethylenically unsaturated group, especially a vinyl, vinylidene, acrylate, methacrylate, allyl or vinyl ether group.

8. A method according to any one of the preceding claims, wherein the ethylenically unsaturated compound is used in the form of a monomer, oligomer and/or polymer.

9. A method according to any one of the preceding claims, wherein the ethylenically unsaturated compound is a mono-, di-, tri-, tetra- or poly-functional acrylate, methacrylate or vinyl ether.

10. A method according to any one of the preceding claims, wherein as the plasma gas there is used air, water, reactive gas, inert gas, or a mixture thereof.

11. A method according to any one of the preceding claims, wherein method step b) is carried out by immersion, spraying, coating, brush application, knife application, rolling, roller application, spin-coating, printing or pouring.

12. A method according to any one of the preceding claims, wherein the liquid used in method step b) contains the initiator(s) in a concentration of from 0.01 to 20 %, preferably from 0.1 to 5 %.

13. A method according to any one of the preceding claims, wherein the liquid used in method step b) contains the unsaturated compound(s) in a concentration of from 0.1 to 30 %, preferably from 0.1 to 10 %.

14. A method according to any one of the preceding claims, wherein the liquids used in method step b) may additionally comprise other substances, for example defoamers, emulsifiers, surfactants, anti-fouling agents, wetting agents and other additives customarily used in the coatings industry.

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15. A method according to any one of the preceding claims, wherein the thickness of the applied layer in the dry state ranges from a monomolecular layer up to 2 mm, preferably from 2 nm to 1000 µm, especially from 2 nm to 1000 nm.

10 **16.** A method according to any one of the preceding claims, wherein in method step c) irradiation is carried out using sources which emit electromagnetic waves of wavelengths in the range from 200 nm to 20 000 nm or by means of electron beams, optionally preceded by a drying step.

15 **17.** A method according to any one of the preceding claims, wherein in method step c) irradiation is effected over the whole area or parts thereof.

18. A method according to any one of the preceding claims, wherein in method step c) partial irradiation is effected and unexposed material is then removed.

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19. A method according to any one of the preceding claims, wherein method step d) is carried out by immersion, spraying, coating, brush application, knife application, rolling, roller application, spin-coating, printing, pouring, lamination, vapour deposition, sputtering or bringing into contact.

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20. A method according to any one of the preceding claims, wherein the coatings applied in method step d) are organic and/or inorganic materials.

30 **21.** A method according to any one of the preceding claims, wherein the coatings applied in method step d) are solid or liquid materials.

22. A method according to any one of the preceding claims, wherein the coatings applied in method step d) are resist materials, paints, colorants, release layers, protective layers, printing inks, adhesives and/or films, woven fabrics, fibres, metallic layers.

23. A substrate having a reactive layer, obtainable by a method according to at least one of the preceding claims.
